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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/032,687 | 12/28/2001 | Hyung Kyun Kim | 29936/38063 | 7293 |

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EXAMINER

GUERRERO, MARIA F

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2822

DATE MAILED: 10/15/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/032,687

Applicant(s)

KIM ET AL.

Examiner

Maria Guerrero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 December 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is the First Action on the merits.

Claims 1-5 are pending.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

3. Figures 1A-3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities: the Detailed Description and the Description of Prior art described the process using the same set of drawings.

Appropriate correction is required.

Claim Objections

5. Claim 1 is objected to because of the following informalities: claim 1 recites "and then etching a spacer to form a spacer at a sidewall of the patterned conductive layer and the hard mask". The Examiner suggests that Applicant deletes the expression "a

spacer" after the term etching because it is considered to be redundant. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Harakawa (JP 07-183513) (Translation).

Harakawa teaches forming a conductive layer on an insulating film formed on a semiconductor substrate, depositing a nitride film on the conductive layer by a low-pressure chemical vapor deposition, and patterning the nitride film to form a mask. Harakawa discloses patterning the conductive layer, depositing a nitride film by low-pressure chemical vapor deposition, and etching the nitride film to form a spacer at a sidewall of the patterned conductive layer and the patterned nitride (hard mask) (Translation, Detailed Description, Example, Figures 2-5).

Harakawa (Translation) is silent about using the patterned nitride (hard mask) to form the patterned conductive layer. However, Inumiya et al. (U.S. 6,017,809) is cited as evidenced that Harakawa shows using the patterned nitride (hard mask) to form the patterned conductive layer (Inumiya et al., col. 1, lines 28-57).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harakawa (JP 07-183513) (Translation).

Regarding claims 3 and 5, Harakawa teaches the nitride (hard mask) having a thickness of 100 nm (1000 Angstroms) and the nitride film for forming the spacer having a thickness of 100 nm (1000 Angstroms) (Translation, Example, page 1).

Harakawa does not specifically show the specific range as claimed. However, in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See also MPEP §2144.05.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to recognize that the claimed thickness overlaps or lies inside ranges disclosed by Harakawa.

8. Claims 2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harakawa (JP 07-183513) (Translation) in view of Beinglass et al. (U.S. 5,932,286).

Regarding claims 2 and 4, Harakawa fails to show using a single type chamber having a temperature of 600° C to 800° C and a pressure of 1 Torr to 500 Torr. Harakawa fails to show using a batch type chamber having a temperature of 600° C to 800° C a pressure of 0.1 Torr to 1 Torr. However, Beinglass et al. shows depositing silicon nitride using the single type chamber having a temperature of 750° C and a pressure of 5 Torr to 100 Torr (col. 2, lines 33-55). Beinglass et al. also shows low pressure chemical vapor deposition process for the deposition of silicon nitride layers are well known in the art employing a batch-type processing chamber having a pressure of about 300 millitor (col. 1, lines 10-16).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Harakawa's process by specifying the type of chamber employed, the pressure, and the temperature as taught Beinglass et al. The modification would provide highly uniform silicon nitride films (Beinglass et al., col. 2, lines 19-20).

In addition, in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See also MPEP §2144.05.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Costaganna (U.S. 6,207,580) teaches the use of silicon nitride as

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a hard mask as conventional in the art. Hsu et al. (U.S. 5,796,151), Lin et al. (U.S. 6,316,805), and Wu (U.S. 6,455,383) show forming silicon nitride films by Low Pressure Chemical Vapor Deposition as well known in the art. Lee (U.S. 6,194,294) is cited to show that to use a patterned hard mask to patterning a conductive layer is well known in the art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 703-305-0162.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Maria Guerrero
Maria Guerrero
Patent Examiner
October 9, 2002